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THE PROBLEM OF INDIVIDUALITY

A COURSE OF FOUR LECTURES DELIVERED BEFORE THE UNIVERSITY OF LONDON IN OCTOBER 1913

BY

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PREFACE

THIS little volume contains, in an almost unaltered form, the four lectures which I had the honour to deliver before the University of London in October 1913. In a rather condensed manner the same subject was treated in a single lecture which I afterwards gave at the invitation of the University of Cambridge. The interest taken in the subject was, I was glad to observe, very great in both places. For this reason, and also because I have the general impression that great interest in questions of the Philosophy of Nature prevails all over Great Britain —more, perhaps, than in other countries,—I agreed to the publication of my manuscript.

It is impossible, of course, in the space of four hours to treat the *Problem of Individuality* in full. I therefore do not regard this little book as a definite contribution to the subject, but merely as a sort of intellectual stimulus. The method of discussion which I have chosen represents the line of my own intellectual development, though a more systematic method of argument might well have been possible. A personal accent is allowed, it seems to me, where

the chief aim is to give the hearer or reader an impetus in his own thinking.

The first two lectures may be regarded as a brief revision of the subject, by those who are familiar with my Gifford Lectures on *The Science and Philosophy of the Organism*, or as a sort of introduction, by those who intend to become acquainted with that work. The contents of the third and fourth lecture are new to the British public. The "Logic of Vitalism," as developed in Lecture III., is part of my general theory of Becoming, as explained in my system of logic (*Ordnungslehre*, Jena, 1912). The discussion of the problem of Monism and the metaphysical conclusions in Lecture IV. form part of the contents of a completed work on metaphysics (*Wirklichkeitslehre*), which I do not intend to publish for another year or two. The contents of this lecture may thus be said to be altogether new.

The notes which I have added to the text are intended in the first place to establish the relation of my own theoretical and philosophical views to those of recent British authors. I am very glad that there is so much intellectual relationship between British philosophers and biologists and myself. This is a consequence, it seems to me, of our common conviction that philosophy and, in particular, metaphysics must take notice of the results of science, and cannot, so to speak, live a life by itself, as "ontology" did in the past—a conviction which, I

hope, will also gain ground among students of other countries.

The same English friend who revised the *Gifford Lectures* on the linguistic side has kindly attended to the text of the present volume in manuscript and proof.

HANS DRIESCH.

HEIDELBERG, *January* 1, 1914.

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FIRST LECTURE

INTRODUCTION—EXPERIMENTAL EMBRYOLOGY—FIRST PROOF OF VITALISM

EVERY problem of the philosophy of nature or, what is almost the same thing, every problem of theoretical science may be discussed in two very different ways. We may begin with what is generally called "the facts," or we may begin with the Ego as conceiving "facts"; we may either ascend or we may descend. In the first case we arrive at a certain logical scheme postulated by the facts as they are, in the second we end by realizing that the facts discussed are the factual illustration of certain *a priori* possibilities. Neither of these two methods is strictly exclusive of the other, for, on the one hand, there is a good deal of logic in what is called "facts," and, on the other hand, there is something factual, so to speak, in all the concepts of logic, except the principle of identity, and especially in the general concept of *Nature*. But, nevertheless, the two methods may clearly be distinguished in practice, and this in every case, whether a problem of mechanics be the subject or a problem of biology.

There can be no doubt that the descending way

is preferable from the philosophical point of view. We should start from the concepts of general logic as the *theory of order*, from concepts such as *this*, *such*, *relation*, *other*, *implication*, *member*, *arrangement*, *manifold*. We should develop the concept of *Nature* on the basis of everyday knowledge, and we should try then to discover what Reason makes of this strange thing called "Nature," *i.e.* what the general logical scheme of "Nature" *might possibly* be. At the end of all would come "the facts" of empirical science and would fit into certain places in the general logical scheme of "Nature," or even cover the whole.

But this kind of argument, though certainly superior to the other philosophically, because it is founded on the very essence of reason, is also much more difficult, at least for all who are not trained philosophers. All men are reasoning beings, but they do not *consciously* reason. We, in fact, do not realize what we are doing, what an enormously complicated logical operation we are performing, when we merely pronounce such an everyday phrase as "I got a letter from my friend this morning."

This being so, I shall not adopt the descending or deductive method of discussion alone in this course of lectures. Nor shall I pursue the ascending or empirically inductive method quite exclusively. To do so would detract from the absolute intrinsic necessity, the legitimate character, if I may say so, of the most general statements to be reached. I shall adopt *both* methods, one after the other, and let them come together. Let us, then,

begin by formulating a certain well-known problem of natural science proper, without any particular philosophical aims at the outset.

Nobody will deny that the individual organism is of the type of a manifoldness which is at the same time a unity, that it represents a factual *wholeness*, if we may express its most essential character in a single technical word. And there is also not the least doubt that a great many of the processes occurring in the organism bring about this *wholeness*, or restore it if it is disturbed in any way. Processes of the first class are generally called *embryological* or ontogenetical. The restoring ones are spoken of as *restitution* or "regeneration" if the wholeness of the form as such is restored; they are described as *adaptation* if the physiological state of the organism has been disturbed and has now to be repaired; the factual wholeness represented by the organism being not merely a wholeness of form as such, but of living and functioning form. All of you know something, at least in rough outline, of the embryology of the frog; you have heard of the regeneration of the leg of a newt, and of the strange fact that in man one of the kidneys becomes larger if the other has been removed by an operation rendered necessary by some disease. These are three examples of processes which *bring about* or *restore* wholeness.

Let us now call all processes leading to factual wholeness *teleological* or purposeful processes. The expression "teleological" is for the moment to be nothing but a mere word, descriptive of a certain factual feature on the analogy of human acting.

There are the individual organisms, each of them representing manifoldness in unity, *i.e.* factual wholeness, and *there are* processes, of at least three different kinds, embryological, restitutive, and adaptive, leading to this wholeness *as if* the existence of this wholeness were their "purpose." They always lead to wholeness; they have done so, and do so, and will do so, in innumerable cases.

So far there is a simple statement of fact, described by a certain technical name; there is as yet no problem. But a problem, in fact, *the* problem of biology at once arises, as soon as we consider a certain possibility that is suggested to us by another well-known fact. We are familiar with certain products of human workmanship which, factual wholenesses in themselves, produce other wholenesses by the processes which occur in them. These products of human work may, then, also be said to act "purposefully"; they are called *machines*; at least machines of certain kinds are of this type. Now, all single acts of becoming in a machine, taken by themselves, are of the *physico-chemical*, or mechanical, or, so to say, "inorganic" type. Wholeness, then, *may* be produced by a constellation of single *inorganic* or *mechanical* processes, in short by the working of a *machine*, and thus we are faced by the fundamental problem:

Is organic individual wholeness produced on the basis of a machine, i.e. *by processes which, though arranged in a special given manner, are in themselves inorganic processes, as known from physics and chemistry, or are there in the organism whole-making processes* sui

generis, i.e. *processes not reducible to the forms of inorganic becoming?*

This, then, is the central problem of biology proper: *Mechanism or Vitalism?* if by "Vitalism" we mean the possibility, merely negative at first, that there *may* be processes in the organism which are *not* of the machine-like or "mechanistic" type, and which may be said to be "teleological" or purposeful in more than a merely formal sense.

It follows from the negative character which the concept of "vitalism" must necessarily have at the outset, that the argument employed in dealing with the great question must be of a particular logical type. If ever we are able to "prove" vitalism, the proof can only be an apagogical proof, or a proof *per exclusionem*, *i.e.* it can consist only in our becoming convinced that a machine *cannot* be the foundation of life. For the concept of a *machine* is all that has been established as something positive, so far; and the question is whether there be a machine *or not.*

It would be impossible in the course of these lectures, in which biology proper forms only part of the subject, to discuss all classes of biological phenomena at full length, and to inquire with respect to each class whether "teleology" is here of the machine-like or of some other type. This I have done elsewhere, and I may be allowed to refer to my published work on the subject.[1] Before my present

[1] *The Science and Philosophy of the Organism*, The Gifford Lectures delivered before the University of Aberdeen in the years 1907-8, 2 vols. London, Adam & Charles Black, 1908.

audience I shall select those biological facts that seem to me to be best suited to decide our question, and shall mention the rest only in a few words. For it is not with biology alone that we have to do in this course; biology is only to yield us the solid foundation on which a factual—and not merely a formal—understanding of the *universe* is to be obtained.

The facts of *active adaptation*—I do not speak here of "adaptedness," *i.e.* of being adapted, as a state—the facts of adaptation are very numerous. Take for example what is called *functional adaptation*, *i.e.* the fact that glands, muscles, bones and other tissues of the body arrange their quantity and even their structure in correspondence to changes of the general functional state, so that a bone, for instance, may even adapt itself histologically to its being broken. Let me further remind you of the adaptive structures of amphibious plants, adapted to the water as well as to the air, and of the remarkable histological adaptations of the larvae of *Salamandra*, according as they are reared in the water or in the air, as discovered by Kammerer. There are also well-known cases of purely physiological adaptation, unaccompanied by histological changes; the regulation of heat-production in warm-blooded animals belongs here, as does the selection of food materials out of given mixtures of food by Fungi, as discovered by Pfeffer—to mention only some of the most remarkable cases. Lastly, there is the production of so-called "antibodies" in correspondence to poisons and other substances, a fact which underlies

the phenomena of immunity. In this case the range of active adaptation is very great, for the organism, at least of the higher vertebrates, is able to protect itself against an enormous variety of substances by the production of a material that counteracts their harmful effects.

This short survey has reminded you of well-known facts. What is the importance of these facts with regard to our central problem?

There cannot be the least doubt that all facts of adaptation are *teleological* in the sense defined; they re-establish functional wholeness after it has been disturbed; and we know that the organism is not only *whole* as regards its mere form, but that it is *whole* as a living, *i.e.* functioning form.

But, strange to say, none of the facts of adaptation, not even the curious facts of immunity and the production of "antibodies" have any decisive bearing on the question "mechanism or vitalism." Not that they are against vitalism in any way, if you are inclined to accept it; but they simply do not *prove* anything with regard to vitalism as the *only* possible form of a theory of life—and that is what a real theory of vitalism would require.

We have contrasted vitalism with the *machine*-theory of life. Now nobody could say from the facts of adaptation *taken by themselves* that a machine could *not* be the pre-established foundation of their happening. Such a machine would be very wonderful, very improbable even *qua* machine, in particular in the case of the production of antibodies to react against materials that had *never* entered the organism

before. But the machine would not be *impossible*, and its *impossibility* must be demonstrated in order to establish vitalism.

Here, then, we may leave the facts of adaptation,[1] not without a certain feeling of disappointment; they can teach us nothing but what we are taught, say, by the selective faculties of the kidney. They may *in principle* be explained "mechanically," just as is possible with respect to secretion, if only we attribute to the secreting organ, the kidney for example, a very complicated pre-established arrangement of its minute structure.

The study of adaptation, then, only teaches us a good deal with regard to the purposefulness of organic phenomena, but nothing more. Will the result be any more fertile, if we study the wonderful facts of *regeneration* in the same way? Strange to say, it will not. Regeneration in all its forms, be it regeneration of the embryo or of the adult, if only taken *as regeneration*, *i.e.* as a process repairing disturbed *wholeness*, would again make us familiar with a certain class of teleological processes, but would not do more. We should be dealing only with probabilities as regards the problem of vitalism.

But we want more; and we *can* gain more, if we only change our method of analysis. We must not attack *teleology* so directly and immediately in order to see whether it is of the machine-like or vitalistic type. We must devote ourselves to the facts without bias of any kind. It will be found that we

[1] For a full discussion of the facts of adaptation refer to *Gifford Lectures*, vol. i. pp. 165-213.

get to real vitalism if we leave "teleology," at first, quite alone.

At the end of the 'eighties of the last century Professor Roux of Halle laid the foundations of *Entwicklungsmechanik*, a "new branch of anatomical science," as he called it. By the word *Entwicklungsmechanik* Roux means a branch of biology which may properly be called the *physiology of morphogenesis* or, in short, the *physiology of form*. It is an analytical and experimental science, just like physiology proper; ontogenesis, all kinds of restitution, heredity, phylogeny are its subjects.

Let us now enter a little more deeply into the *embryological* part of *Entwicklungsmechanik*.[1] Roux has worked out a sort of programme for this branch of the subject, and to it his own experimental investigations relate. At the beginning of his studies Roux was an *evolutionist*, almost in the same form as Weismann; and so-called evolutionism in embryology has always been a special form of machine-theory from the time of Leibniz to the present day. There is a very complicated machine in the egg and in particular in its nucleus—so Roux and Weismann said,—and the development of the embryo is carried out by the *disintegration* of this machine during the great number of cell-cleavages which occur during the embryological process.

This was a possible theory, no doubt, and it seemed for a short time to be the right theory, for Roux happened to perform an experiment which,

[1] Cp. *Gifford Lectures*, vol. i. pp. 25-164.

standing alone as it did, could really be considered as a sort of proof of embryological evolutionism.

Roux killed one of the first two cleavage cells of a frog's egg that had just performed the first cleavage; and from the surviving cell he reared an embryo which was in all respects *one half* of a normal one, that is to say, either the right or the left side of it. Was not this a very convincing result? It seemed so, no doubt—but only for a few years.

In 1891 I repeated Roux's experiment by a somewhat different method on the egg of the common sea-urchin. And my result was just the reverse of what Roux's result had been: not one half of an embryo was reared out of the surviving cell, but a *complete* embryo of *half size*. And I also observed the development of *complete* embryos of smaller size when I made my experiments with the four-cell-stage instead of the two-cell-stage. I might destroy one or two or even three of the first four cleavage cells; in the latter case I got a *very* small embryo—but it was *complete* in its organization.

Before we proceed in our argument let us make ourselves familiar with two technical concepts; this will prove to be very useful for what is to come. I mean the two concepts of *prospective value* and *prospective potency*, now quite familiar to embryological experimenters. By the *prospective value* of any embryonic cell whatever, I mean the *actual* fate which that cell will have in the special course of development going on before our eyes, be it normal or abnormal. By *prospective potency* I mean not the actual but the *possible* fate of a certain cell, *i.e.* the

totality of possible characters of the adult into which this cell may develop.

Using these two concepts just defined, we may formulate what we have learned so far about the theories of Weismann and Roux and about the experimental results, in the following way. Roux and Weismann believed at first that the prospective value of a cleavage cell under normal conditions was *identical* with its prospective potency or, in other words, that its potency was strictly limited, and Roux believed he had proved this by his experiment with the frog's egg. But I was able to show that, for the egg of the sea-urchin at least, prospective value and prospective potency are *not the same*, the range of the prospective potency, *i.e.* the range of possibilities with regard to the morphogenetic fate, being *far greater* than the observation of the prospective value, *i.e.* of the actual fate in the actual case before me, could reveal.

I must next mention another experiment on the egg of the sea-urchin which is logically connected with what we have already learned.

The so-called "cleavage" of the egg, the first stages of which we have already considered, ends in the formation of the *blastula*, *i.e.* a hollow sphere built up of about a thousand cells, forming an epithelium. If you cut this blastula with a pair of very fine scissors in any direction you like, each part so obtained will go on developing—provided it is not smaller than one quarter of the whole—and will form a *complete* larva of small size. This result, certainly, might be expected after what we have

learned from the experiment with the cleavage cells.

We are now at the right point for a theoretical discussion of our results. But before entering into it let us still devote a few words to the results of experiments carried out with eggs other than those of the frog and the sea-urchin. It has been shown that the eggs of very different classes of animals behave exactly as the egg of the sea-urchin does—namely, the eggs of Fishes, Newts, Amphioxus, Nemerteans, Medusae, etc. It has moreover been proved that even the frog's egg, the classical object of Roux's researches, produces a *small but complete* embryo from one of its cleavage cells, if only you give the cell an opportunity for a certain rearrangement of its protoplasm. And, finally, it is now known that in cases where, contrary to the behaviour of the Echinoderms, the prospective value of cleavage cells is truly fixed—as is the case in Annelids, Molluscs, and, to a certain extent, Ascidians—the fixation depends *solely* upon a certain physical state of the protoplasm, which does not allow of *any* regulatory rearrangement. It has been shown that in the forms with a fixed prospective value of the cleavage cells the nuclei, quite contrary to the theory of Weismann, are without any diversity, and that moreover there is no prospective specification in the protoplasm *before* cleavage really begins, or rather, to state it quite exactly, before so-called maturation. For you may alter in a fundamental manner the relative position of the nuclei of the cleavage cells with respect to one another by pressure experiments, or

you may remove any portion you like from the egg before maturation: in both cases you will get complete embryos. Thus, then, our experimental results may be said to be of *universal* validity.

And now let us turn to the theoretical aspect.

How are we to account for what we have learned? A theory like Weismann's is impossible in the face of the facts. There is certainly *not* a machine in the egg that is disintegrated step by step during the cleavage, for *single* cleavage cells give *complete* organisms; and this relates to the protoplasm as well as to the nuclei. Might not, however, some other form of the machine theory fit the case?

In order to come to a conclusion in this difficult question I propose to formulate analytically, in quite a simple and unbiassed way, what our experiments have really shown us; and in particular I refer to the experiment with the blastula of the sea-urchin or the starfish.

Fragments of this blastula always gave complete embryos, though cut quite at random. This could only be possible, if the prospective potency of all the thousand blastula cells was the same, just as the potency of the two or four first cleavage cells proved to be identical. Let us apply the term *equipotential ontogenetic system* to any ontogenetic totality which consists of cells with equal prospective potency, *i.e.* with an equal possible fate; then the blastula is, in short, an *equipotential system.*

But we must analyse our case still further, for there exist "equipotential" systems, which are very different from the blastula with regard to morpho-

genetic significance, in spite of their equipotentiality. The *ovary*, for instance, is certainly "equipotential," for each egg is "equally" able to form the organism; and yet there is a great logical difference between the ovary and the blastula. In the ovary each element of the system is equally able *to form for itself the same complex totality*, namely, the organism; we may speak of a "complex-equipotential system" in this case. But in the blastula each element is equally able *to play any single part in the formation of one totality*. Any particular cell would have played another single part, had you cut the blastula in some other direction; it can play *any* single part required. And what it actually does in the special case—normal or experimental—is always in *harmony* with what is done by its fellow-cells, which possess the same great potentiality as itself. Let us, then, call our blastula an *harmonious-equipotential system*.

On the discussion of the harmonious-equipotential system and its differentiation will depend our most important argument in favour of a vitalistic conception of biology. It is important, therefore, that this concept should become a little more familiar to you, and for this purpose the analysis of some other instances of harmonious equipotentiality is of great use. Harmonious systems not only appear elsewhere in embryology—the two so-called germ-layers, for instance, are of this type[1]—but very often they are the basis of *restitution*, which in this

[1] A very important case of harmonious equipotentiality, not mentioned in my *Gifford Lectures*, was afterwards discovered by Braus (see *Morphologisches Jahrbuch*, vol. 39).

case is not "regeneration" proper, *i.e.* not a process of budding from a wound as is the case in the restitution of an earthworm cut into parts. The hydroid *Tubularia* offers a very typical instance of harmonious restitution; but more instructive still is the case of the restitution of the branchial apparatus in the Ascidian *Clavellina*, which therefore may be shortly analysed. In Clavellina the branchial apparatus is quite separated from the rest of the body. If you isolate it by a cut, it either regenerates the body in the usual way by budding processes, or it behaves very differently: it undergoes a complete reduction of form, until it is but a minute sphere, and then, after a few days of rest, transforms itself as it is into a *complete* little Ascidian. This, certainly, is a very strange process; but much more remarkable with regard to our problem is what follows. Isolate the branchial apparatus and then cut it into two pieces of any shape you like; each *portion* will then reduce its form, rest for a few days, and finally transform itself into a *complete* little animal, as did the whole branchial apparatus in the former experiment. The branchial apparatus of Clavellina, therefore, is the very type of a harmonious-equipotential system: each element of it is able to perform any single morphogenetic action that is required, and all the elements together work in harmony in each single case. For the cut may be made quite at random.

How, then, are we to account for these wonderful phenomena of life? Let us first enumerate all the possibilities of becoming that might seem to be present here at the first glance, but are found not

to be present when you look at what happens in detail.

The question is this : *What makes the equipotential system unequal with regard to the actual fate of its parts?* What transforms equal potentialities into unequal actualities? In other words : the *localization* of the various singularities of morphogenesis is the problem. Whence does this localization come?

It does *not* come *from without*, for there are no localized exterior stimuli, responsible for differentiation in our cases of morphogenesis. The various factors or agents of the medium are either without direction or, if possessed of direction (*e.g.* gravity and light), they are notoriously without influence in animal ontogeny.

But localization can also *not* be based upon *purely chemical processes* inside the system. It is true, a chemical compound might be disintegrated, a real mixture might be separated into its component parts and the one or the other process *might a priori* be the main factor in ontogeny. But it cannot be so in fact. For from chemical disintegration or from unmixing there can only arise equilibria of, so to say, geometrical arrangement. But an organism is not a geometrical arrangement or a complex of such arrangements. And, further, there are many organs in an organism which have very different specific forms, though they have the same chemical composition—as for example the bones of vertebrates. For all this a *purely* chemical theory of ontogeny—which otherwise might be compatible with equipotentiality—cannot account.

But if a purely chemical theory of ontogenesis fails, might not some form of the *machine* theory be successful? Not, of course, the theory of Weismann, *i.e.* a theory of evolution or preformation in the narrow meaning of the word; but a theory which, nevertheless, makes use of the concept of a *machine* as the basis of ontogeny, a *machine* being defined as a *given specific combination of specific chemical and physical agents.* Ontogeny might then probably be the result of what would be called the "interaction" of these agents. Thus we know, for example, that the lens of the eye of Amphibians is formed from the epidermis in consequence of a so-called "formative stimulus" on the part of the primary optic vesicle; and there are other cases of morphogenesis of a similar kind.[1]

Now it is not difficult to prove from what we have learned about our harmonious-equipotential systems that *no* machine of any kind soever can be the ultimate basis of ontogenesis as far as harmonious equipotentiality is concerned.

If normal undisturbed embryogenesis alone would result in the formation of a complete embryo, if, in other words, all the experiments carried out with early embryonic stages would result in the production of fragments of organization, then we should feel obliged to accept the theory of machine-like preformation. But this is not the case. On the contrary, the ontogenetic systems are "harmonious-equipotential." Take whatever portion of them

[1] Cp. Herbst, *Biologisches Centralblatt*, vols. xiv. and xv. (1894-5), and *Formative Reize in der tierischen Ontogenese*, Leipzig, 1901.

you like, quite at random, and *yet* there will be completeness of final organization. The embryonic "machine," then, that is supposed to exist in the normal system, would be obliged to be present in its completeness in one *part* of the system also, and also in another such part, and in yet other such parts too, and equally well in parts of different size, overlapping one another (Fig. 1). For we know that

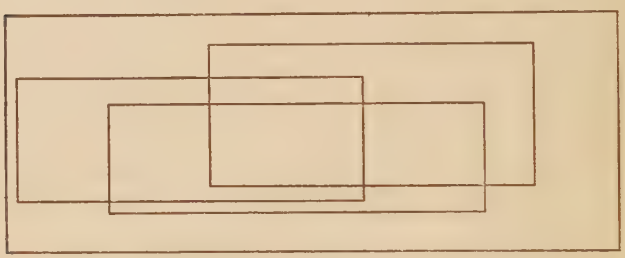

FIG. 1.—The harmonious-equipotential system (H.E.S.).

The large rectangle represents an H.E.S. in its normal undisturbed state. It might *a priori* contain a very complicated kind of "machine" as the foundation of development. But any fragment of the system (the small rectangles and innumerable others), contingent as to its size and to its position in the original H.E.S., is equally able to produce a small *but complete* organism. On the basis of the mechanistic theory, then, any fragment of the H.E.S. would contain the same "machine" as the original system. This is absurd.

any part of the system, contingent as to its size and as to its position in the original system, can give rise to a complete being. *Every* cell of the original system can play *every* single rôle in morphogenesis; *which* rôle it will play is merely "a function of its position."

In face of *these* facts the machine theory as an embryological theory becomes an absurdity. These facts contradict the *concept* of a machine; for a machine is a specific arrangement of parts, and it does not remain what it was if you remove from it any portion you like.

Now the machine theory was the *only* possible form of a mechanistic theory that might *a priori* seem to be applicable to the phenomena of morphogenesis. To dismiss the machine theory, therefore, is the same as to give up the attempt of a mechanical theory of these phenomena altogether. Or, in other words, the analytical discussion of the differentiation of harmonious-equipotential systems entitles us to establish the doctrine of the *autonomy of life, i.e.* the doctrine of so-called vitalism, at least in a limited field: there is some agent at work in morphogenesis which is not of the type of physico-chemical agents.

SECOND LECTURE

FURTHER PROOFS OF VITALISM—ENTELECHY AND ITS RELATIONS TO MATTER AND ENERGY

A TRUTH is either proved or not proved; and, if it is once proved, it is not necessary to prove it further. We therefore might well proceed at once to analyse what is *meant* by saying that a machine cannot be the foundation of ontogeny. But the discussion of certain other *facts* of biology, which also "prove" the impossibility of the machine theory of life, will perhaps give us a stronger personal conviction of the great importance of what we are doing.

New proofs of the *autonomy of life* or of vitalism must, of course, be independent of our first proof; otherwise they would not be "new." It is useless, therefore, especially considering the limited time at our disposal, to analyse here the formation of one single embryo from two eggs, or the restitution of restitution, *i.e.* restitution of the second degree, or the remarkable phenomenon of the equifinality of restitution, the fact, namely, that individuals of the same species may reach the same regulatory result by very different ways. For all these facts are

reducible in the last resort to the problem of harmonious equipotentiality ; if not, they only prove teleology in the general formal sense, and nothing else.

But a truly *independent* "second" proof of the autonomy of life[1] has already been prepared for by certain remarks in the first lecture, and shall now be shortly mentioned. When speaking of equipotential systems in general, *i.e.* of embryonic parts, each element of which possesses the same prospective morphogenetic potency, we said that there are two classes of such systems : *harmonious*, like the blastula ; and *complex*, like the ovary. In a *complex-equipotential* system, it was said, all the elements are *equally* able to form the same *complex* totality out of themselves. It will be easily appreciated that there are various other sorts of complex equipotential systems besides the ovary. The cambium of the higher plants belongs here, the epidermis of Begonia, many tissues connected with animal regeneration, and almost the complete organism of lower plants.

Having studied the *differentiation* of the *harmonious* systems in the first lecture, we shall to-day study the *genesis* or the *origin* of the *complex* ones ; and we shall get a new and important analytical result. That is to say : We shall study not what comes out of the complex systems, but what they themselves come from. And we shall take the ovary as one instance

[1] See *Gifford Lectures*, vol. i. pp. 214-242. J. S. Haldane in his book, *Mechanism, Life and Personality* (1913), accepts what I have called the second proof of vitalism (pp. 56-58), but rejects (p. 27) the first proof. He rejects it, however, without any close analysis of the problem of harmonious equipotentiality.

standing for them all. The ovary develops from one special single cell which is its *Anlage*, to use a German word not easy to translate. This *Anlage* divides and divides many thousand times, at least in lower animals—and as the result of all these divisions we have the single eggs, capable of development.

We now argue in a manner very similar *in form* to our discussion of the harmonious systems, though the subject is now really very different. If we only regard the egg and its normal ontogenesis, we, no doubt, *might* accept the machine theory for the latter. Why should there not be a machine in miniature present in an egg, and representative of the adult, say in the form imagined by Bonnet and Haller or by Weismann? The machine *cannot* be present for the following reason. The egg has undergone an enormous number of divisions before becoming what it now is. But how could a "machine" be divided and divided and—*always remain the same*? And this machine would have to be enormously complex in composition, for the adult organism in all its wonderful manifoldness is to arise from it! But, on the other hand, if you say that our argument is wrong, because the *Anlage* of the ovary was not a machine, and that, therefore, the problem of the "division" of a "machine" does not arise at all —how then does the machine originate in the final products of division in the egg? Where does it come from? Thus it follows that our problem must either be accepted as an independent proof of vitalism, or be reduced to the problem of morphogenesis

without machine-like preformation, *i.e.* the problem of harmonious equipotentiality already discussed.

Our discussion of the genesis of complex-equipotential systems, proving the autonomy of life a second time and independently, may now leave the rather abstract path it has followed so far, and be brought into relation with problems that occupy the centre of interest among biologists at the present day, namely, the *problems of inheritance*. Much has been done during the last ten years to discover the laws and material conditions of inheritance:[1] Mendelism and the cytological investigation of inheritance are among the best established results in biology. If now we have said that, for very important reasons, the egg *cannot* be regarded as the bearer of an embryological machine, that is as much as to say that all Mendelian and cytological investigations about heredity, irrespective of their great and undeniable importance, yet cover but one half of the field. Though there are material units, transferred from one generation to the next, on which the realization of inheritance depends, though we know that these material conditions are localized in the nucleus in particular, these material conditions are *not the main thing*. Some agent that *arranges* is required, and this arranging agent in inheritance *cannot* be of a machine-like, physico-chemical character.

In order to find a *third* independent proof of the vitalistic conception of life we will now leave the

[1] Cp. J. A. Thomson, *Heredity*, 1908, and W. Bateson, *Mendel's Principles of Heredity*, 1909.

subject of morphogenesis and turn to a very difficult branch of biology, namely, the *physiology of movements*.[1] We shall again leave aside everything that has not been studied well enough to be used for our purposes, and shall only discuss what seems really profitable. And our third proof of vitalism will be at the same time the last argument we analyse in favour of the vitalistic doctrine. For I do not intend to deal here with certain groups of rather problematic facts, which are being much discussed nowadays, particularly in this country, but which do not yet allow of any definite interpretation.[2]

It is greatly to be regretted that *instinct* is so very little studied nowadays, at least in an exact way. The important investigations of Lloyd Morgan are almost all that we possess in this field. American authors, it is true, have studied the behaviour of animals in quite an admirable way, but they have analysed almost exclusively such movements as are based upon experience. The main feature of instinct, however, is that it is not based on experience, but is "primary-teleological," *i.e.* perfect in its typical manifoldness *the very first time it occurs*, just like regenerations. There can be no doubt that some of the most important results of biology in the future will be derived from the study of instinct. Let me only shortly mention the two problems which seem to me to be more important than any other: firstly,

[1] See *Gifford Lectures*, vol. ii. pp. 1-113.

[2] This observation is by no means intended to disparage the remarkable work done by the Society for Psychical Research, for which on the contrary I possess the highest admiration. But things are not yet ripe for "theory."

the question whether instincts can be regulated or not, whether they may be modified as circumstances require, like morphogenetic processes ; and secondly, what kinds of stimuli call forth instinctive reactions, whether simple stimuli exclusively, or also complex individualized stimuli, such as, for instance, a specific sort of object as "seen" by the eye. Unfortunately, it is not possible at present to do more than simply state the problems.

Better results await us when we proceed to an analysis of the most complicated form of movement, namely, *action*, *i.e.* that form of movement which, to speak in popular language, rests upon "memory" and "experience," and is not "primary-teleological." The analysis of human action will give us the best results, because, for very obvious reasons, there is no other sphere of biological inquiry in which we are able to discover so many details and varieties of events as here.

But this remark needs a few words of explanation. We proceed as biologists in this part of the lectures ; human actions, therefore, are to be regarded by us merely as forms of *natural* phenomena. And this means that we are not allowed to have recourse to "psychology" in the proper sense. The realm of natural reality and the realm of psychical becoming in the true sense, as discovered by introspection, are separated by an absolute gap. But, nevertheless, *because* we have the faculty of introspection into ourselves we are able to discover many more details and varieties of action in another human individual than in any other living being ; for we know that

our own psychical life is connected with very various minute movements of our body and we are, therefore, well prepared to discover all sorts of minute varieties of movement in the bodies of others.

Everybody knows that the "acting" man is in possession of sense-organs, a nervous system, a brain and muscles; and everybody knows, further, that all these organs are concerned in acting, and that some of them, especially the brain, are enormously complex in structure. But the question is, whether "structure" is at all *sufficient* to explain what really happens in acting. And I hope to be able to show you that it is not.

Let us first consider *action* without reference to the organization, merely as a natural phenomenon possessed of certain peculiar characteristics. These characteristics may be expressed by two technical terms. *Acting* is characterized by its occurring upon an *historical basis of reaction* and according to an *individualized correspondence between stimuli and effects.*

By the *historical basis of reaction* as concerned in acting I mean the well-known fact that the *possibility* of all actions which a man may perform in a special given moment of his life depends on the personal *history* of this man, or, in the subjective terminology which is properly not allowable at this stage, but which helps to make the matter clear, on his "experience." Let an English-born boy be educated all his life in Germany and he will "act," in particular with regard to his speaking, quite otherwise than if he had stayed in Great Britain all his life. Now it seems at the first glance as if it would be by no

means difficult to understand what we have called "the historical basis of reaction" on a mechanical analogy. There is a certain well-known class of "machines" which also "act," so to say, upon one "historical" basis of reaction: the phonograph is one example, and the pianola another. But the moment we mention these machines we know that the acting man is something different. Why is this so?

The explanation is easy. The phonograph and machines of a similar type give forth what they have received with all its specificity. The acting man usually does something else, or rather, something *more*. An actor in the theatre or a boy who recites a poem by heart may be said to give forth in its very specificity what they have received during their personal history; but these are exceptional cases. Which features, then, constitute the difference between the acting man of everyday life and the "actor" upon the stage? We have said already that the actor on the stage gives forth what he has received just *as* he received it. What then does the "historical basis" of reaction mean in the ordinary acting man, if it does not mean specific determination for actions created by personal history?

There is no doubt that the *historical basis* means nothing but a certain *limited totality of possibilities*, a sort of warehouse or reservoir as it were, but nothing specific. At least it is in this respect, as a mere totality of possibilities, that the historical basis comes into account in a real action. The acting person *uses* this basis, but he is not bound

to it as it is. He *dissolves* the combined specificities that have created the basis.

All this, then, serves to discriminate most easily between an acting man and a stage-actor, and still more between an acting man and a phonograph. And moreover, in the phonograph the reaction is just the same physical process as the stimulus, only, so to say, reversed; in the acting man there are sensory processes on the one side and motor processes on the other.

But this is the right moment to begin the discussion of the *second* characteristic of action: *the individual correspondence between stimuli and effects.* For it is only when they are united with one another that the criteria of acting can be fully understood.

The term "individual correspondence" is self-explanatory, and is not at all difficult to understand. We are all very familiar with this feature of action, for we all experience it hundreds of times a day. In acting, stimulus and reaction are *individuals* and not mere *sums*—this is chiefly what the term aims at expressing—and there is a specific correspondence *as individuals* between the *individualized* forms of the stimuli and reactions. It thus appears that, whilst the first characteristic, "the historical basis of reaction," refers to the totality of actions *possible* at a given moment of the life of an acting man, the second characteristic refers to the *actual* action at that moment. The actual action is individualized in specific correspondence to another individuality, subject, of course, to the conditions of the first criterion, *i.e.* the actual individualized reaction corre-

sponding to the actual individualized stimulus is formed out of possibilities which have been "historically" created.

A good instance of what the criterion of individual correspondence in action means is afforded by a conversation between two friends who speak several languages. To these a phrase spoken in English, German, or French is *the same* "individualized stimulus," though physically the processes are totally different. And, on the other hand, phrases which are almost identical from the physical point of view, may be very different individual stimuli. Think of the German words for "my, your, his," *mein*, *dein*, *sein*, and imagine the fundamentally different effect produced in the "stimulated" person according as he hears one or other of these words at the beginning of a phrase, *e.g.* "My, your, or his money is lost," "My, your, or his father is dead." In German *only one consonant* would be different in the three phrases. And, what is still more strange than the facts mentioned, do we not know that a "stimulus" has the *same* effect on acting even if it is "written" in one case and "spoken" in another?

Thus it is not possible to connect every single *element* of the stimulus with a single *element* of the reaction; but one *totality* is connected with one other *totality*.

And now we are prepared to say whether "action" is explainable upon the basis of the *machine theory* of life or not—whether material processes in the brain and nervous system can fully account for what really happens.

If the acting man behaved like a phonograph or a machine of a similar type, we could accept the machine theory; but he does not behave like that machine and, what is more, all the peculiarities which distinguish him from the phonograph are such as to distinguish him from any machine whatever. The phonograph, when reacting, only reverses the series of processes that have encountered it. Even of an actor—who not only reverses a causal series but learns by means of his eye or ear and speaks with his mouth—we might go so far as to say that what he does *might* be explainable by the machine theory. But the acting man, we have seen, is not a stage-actor. *He is the sovereign of the results of his personal history;* his history affords him only *means* of future acting and nothing more. When he acts, these means are used according to the principle of *correspondence among totalities*; it is not that one part of the stimulus causes one part of the effect according to a fixed order. In action nothing is fixed in the sense of what fixation means in anything like a "machine." And the "machine" itself in this case —I mean the historical basis of reaction—has been made from without!

Thus, then, we are entitled to say that the characteristics of action, considered as a natural process, forbid us to accept the machine theory.[1]

What we have brought forward against the

[1] I am very glad to learn that William M'Dougall, in his interesting and thorough book, *Body and Mind* (1911), not only accepts my argument in favour of the autonomy of action (p. 268 ff.) but also the results of my discussion of experimental embryology (p. 241 ff.).

mechanical theory of life, as far as acting is concerned, is a certain part of the arguments employed against the theory of so-called *psycho-physical parallelism*, *i.e.* the theory that psychical phenomena are but "the other side" of an unbroken causal series of the mechanical type. And, in fact, the problem of action has close logical relations with the central problem of Psycho-physics.[1]

Those who reject the theory of parallelism are generally — apart from arguments of the purely metaphysical class — accustomed to say that psychical phenomena and events cannot be the "other side" of physical, *i.e.* mechanical states and processes, firstly, because there is unity in the one case and a sum in the other, even the most complex thought being always possessed as *one*;[2] secondly, because the relation of all the various objects to one single subject, the Ego, has nothing similar in the mechanical world; and thirdly, because the power of the Ego to *use* its experience in *thinking* and in *imagining* could never be something mechanical "from the other side." There is the concept of *evidence* on the one hand and of *psychical progress* on the other, and both mean the formation of something *new*. The truth of Galilei's principle of inertia is "evident" to you,

[1] See *Gifford Lectures*, vol. ii. pp. 114-117 and pp. 287-295. Compare also the important discussions of the problem by James Ward in his *Naturalism and Agnosticism* (2nd ed., 1903, vol. ii. pp. 1-93); by L. Busse in his work, *Geist und Körper, Seele und Leib* (1903); and by M'Dougall (see last note).

[2] Modern psychology has made it quite clear that real psychological entities are all of the type of complex unities, *i.e.* of the same type as "thoughts." A pure "sensation" is an artificial abstraction. Compare the analysis given in my essay, *Die Logik als Aufgabe* (1913).

though what you have experienced in a merely passive way flatly contradicts it; and all progress in culture, including science and art, rests upon invention and not upon mere reproduction. Now, this is stating in psychological terms what we have already said with regard to the characteristics of action considered as a natural phenomenon. The "historical basis" is merely used but not reproduced. The stimuli and the effects in action, we said, are unities and are not related with one another part by part. They both have a *meaning*, a *significance*, we may now say, speaking in terms of psychology. And we may add that it is precisely their *meaning* as *thoughts* that remains "the same," whether they are expressed in English or German or French, whether they are written, printed or spoken, or otherwise conveyed.

In short, the vitalist cannot accept the parallelistic doctrine of certain psychologists with respect to action, at least not in so far as this doctrine holds that the *natural* side of action is one unbroken line of mechanical events.

The mention of psychology now leads us from our proofs of vitalism, which as factual proofs are complete for the present, to certain *general considerations* which stand, so to say, half-way between science proper and pure philosophy. And in the first place something more may be said with regard to Psychology.

We believe we have proved that certain great classes of facts in organic Nature are not of the

physico-chemical type, but have an autonomy of their own. This is, at first, nothing but a mere *negative* statement, and we go no farther if we introduce the Aristotelian word *entelechy* as a name for the autonomous agent at work in the vital processes we have been studying. Entelechy is something that is non-physico-chemical; and the only positive character we are entitled to attribute to it, so far, is that it is an actual elementary agent or factor of *Nature*, the word "entelechy" being not merely a name for a formal point of view. It is important to grasp the *provisional negativeness* of entelechy, because it will save us from a mistake often committed by vitalists, namely, the mistake of regarding the vitalistic agent as something "psychical" without further consideration. But the contrary of *mechanical* is merely *non-mechanical*, and not "psychical." And, moreover, in Nature there is no room for "psychical" entities at all, if, at least, the concept of Nature and the concept of the Psyche are well defined. I may talk of *my* own psychical life, or of *my* soul, if you like to call it so; but even to speak of what are popularly termed the "souls" of others is already to make a statement with regard to Nature that ought really to be formulated in another terminology. It, therefore, is quite meaningless at first, and will perhaps only acquire a meaning in metaphysics, to say that entelechy is "psychical" in character. On the contrary, that which is generally spoken of as "psychical" in other beings, men or animals, is, strictly speaking, in the sphere of natural science simply *non-mechanical*; but we can assert nothing as

to its nature until we have undertaken special logical inquiries.

Only in the region of metaphysics, we repeat, entelechy may possibly appear to be of a "psychical" type. But even then the word "psychical" would not be applied without a certain limitation, at least with regard to the phenomena of instinct and all organic regulations. For even if you were to use the word "psychical" with regard to these phenomena you would mean something very different from what you mean when you apply the word to other human beings. For all instincts and restitutions *do not rest upon experience*; they present themselves in a *primary* teleological manner the very first time they occur. It is as if entelechy had a knowledge of peculiarities *without having met with them*. Great caution then is required with regard to the biological application of the word "psychical" even in a metaphysical sense.[1]

We now consider the question whether anything whatever, and if so, what, may be said about *the relations between mechanical and non-mechanical agents* in Nature. There can be no doubt that this part of our analysis will be of great importance.[2]

And in the first place let us consider the relation of our biological entelechy, *i.e.* the non-mechanical agent responsible for the phenomena of life, to the concept of *substance* as employed in inorganic

[1] A full discussion of "Psycho-Vitalism" will be found in Marcus Hartog's remarkable book, *Problems of Life and Reproduction*, London, 1913, particularly in chapter ix. Hartog's own vitalistic theory ("Mitokinetism") is explained in chapters iv. and viii. of his work.

[2] Cp. *Gifford Lectures*, vol. ii. pp. 153-265.

science. Whatever our metaphysical conception of a "substance" may be, with respect to the science of non-living Nature we mean by *substance in space* something that, firstly, possesses a certain quality or, rather, in order to exclude sensible "quality," let us say *suchness*. This something, secondly, *endures* with regard to its suchness at least for a long period; and, thirdly, the concept of *so much* is applicable to it, or, in other words, it possesses *quantity*. This *substance in space*, now, may be conceived mechanically as mass, or electrodynamically as electrons with their fields, or in any other way whatsoever. In any case we see that entelechy is not a "property" or attribute or accident, or anything similar, of a substance in space in the sense defined. For it is among the chief characteristics of a substance in space to be measurable, say by weight, because it has quantity; and it would be nonsense to apply the concepts of "quantity" and "measure" to something which has only to do with the *arrangement* of a manifoldness.

Thus, then, entelechy does not depend for its existence—I do not say for its active effects—on substance in space. And for the same reasons for which it does not depend on substance in space, we are allowed to say that it is not a species of so-called *energy*. For energy is nothing but a *measurement of causality in space*. How could arrangement and arranging be measured?

Now, the recognition of the non-energetic character of entelechy has a very important consequence. If entelechy is not a kind of energy itself, if it is non-energetic itself, it follows that the *principle of the*

conservation of energy, which is *a priori*, *i.e.* a postulate of reason, in its last resort, at least under certain conditions, *need not necessarily be violated* by vitalism. And this is what physiological experience teaches us. The experiments of Rubner, Atwater, and others have shown most clearly that the principle of the conservation of energy holds good for the organism, that a stream of energy, so to say, passes through it. There is no disappearing or appearing of energy into or from nothing ; entelechy does not create energy—at least as far as we know.

I add these words of limitation, because it is not absolutely unthinkable that entelechy *might* create energy. The principle of conservation is a postulate only as long as *spatial* causality is the only form of causality in a system—as will be fully explained later on. But any form of vitalism allowing entelechy to create energy would be more complicated than a form that does not allow this ; and it is a sound principle of methodology to reduce complications to a minimum.

But how is vitalism in its relations to inorganic phenomena intelligible at all, if entelechy is neither dependent on a spatial substance, nor energy itself, nor creative of energy ? It is here that we begin with certain positive characteristics of entelechy. Unfortunately in doing so we are entering upon the most difficult and obscure regions of theoretical natural science.

We reject the hypothesis that entelechy may create energy, firstly, on account of the unnecessary complication that would thus be introduced—unnecessary

because we have something else to offer, as we shall see presently. We reject that hypothesis, secondly, because it would not account for a well-established biological fact—the *limited* character of all regulations, adaptive or restitutive. There *are* limits of regulability, and there *is* a very strictly defined dependence of life on certain quite specified conditions of the medium. Herbst has shown, for instance, in a well-known series of experiments that a very definite combination of salts *must* be present in the sea-water in order that the embryo of marine animals may develop; and we know that the organism depends on oxygen, heat, and other agents for the most fundamental features of its life. All this would be quite unintelligible if entelechy could create energy just as it wanted it.

For the same reason, namely, because it would not account for the limits of regulability, we must reject a further *a priori* possible hypothesis about the relations between the mechanical and the non-mechanical world. I refer to the famous hypothesis, first established by Descartes with regard to the influence of the "soul" upon the body, that the Non-mechanical might *turn* portions of matter with all their inherent forces, and so change the direction of given forces. This would not alter the principle of the conservation of energy in its most general form—though it would, if this principle were enunciated for any of the three dimensions of space separately,—and yet we cannot accept the Cartesian theory, because there are such strict limits of regulability in the organism.

But what are we to do if we want to account for the material limitations of life and yet at the same time introduce some kind of becoming that is alien to what we know from inorganic Nature? There is but one way left open to us, it seems to me; and this is the hypothesis that the non-mechanical agent at work in life may *suspend* such kind of happening as would occur if not so suspended, such as, in other words, is *possible* on account of pre-established "uncompensated differences of intensities of energy," or whatever you choose to call the necessary conditions of purely inorganic processes. Here we have at once a very specified non-mechanical kind of happening, and yet it enables us to understand the limits of regulability. Entelechy is bound to material conditions, not for its existence but in its effects. The so-called material *continuity* of life now means simply that there are certain areas of matter, certain material systems, embracing an enormous number of possibilities of happening in the form of differences of "potential," to use a technical term, certain material systems that are permanently under the control of entelechy.

Where this controlling action on the part of entelechy comes from, we do not know at all. We are therefore *absolutely unable to say anything whatever about the origin of life.* Life is there, and is transferred from generation to generation in material continuity; and this material continuity means a continuity of systems under control.

All this is very abstract and general; it may be more easily understood if we look once more at the

differentiation of our morphogenetic harmonious-equipotential systems. Such a system consists, say, of *n* cells, all equipotential. This then means, according to our hypothesis, that in each of the *n* cells the *same* great number of possibilities of becoming is physico-chemically prepared, but checked, so to say, by entelechy. Development of the system now depends, according to our assumption, upon the fact that entelechy *relaxes its suspensory power* and thus allows events to go on. And the relaxation is different in each cell, and differs also according to the different cases established by experiment: in cell *a* one thing is allowed to occur, in cell *b* another, and in cell *c* something else; but what now actually occurs in *a* might also have occurred in *b* or *c*; for *each one* out of an enormous number of possibilities *may* occur in each cell. Thus, by the regulatory *relaxing* action of entelechy in a system in which an enormous variety of possible events had been suspended by it, it may happen that an *equal distribution* of *possibilities* is transformed into an *unequal distribution* of *actual effects*. And all this without any omnipotence on the part of entelechy.

Let it be well understood that the *relaxing* action of entelechy which we have assumed is absolutely non-energetic. There is nothing like the removal of a mechanical obstacle by what in German is called an *Auslösung*; for such removal would require a certain amount of energy, however small. The relaxing action of entelechy is entirely an action *sui generis*, just as the suspending action was.

This then, it seems to me, is the only possible

way in which the causal relation between the mechanical and the non-mechanical world can be made intelligible without sacrificing the *fact* that organic life is limited by matter.[1]

In the next lecture we shall try to ascertain what the concept of a "non-mechanical" natural agent means to the student of *logic*, or whether it can have any meaning at all to him. In other words, we shall try to legitimate our concept of entelechy positively and directly. What we have effected so far is only an indirect legitimation, namely, the proof that the agent we call Entelechy is compatible with the agents known to be at work in inorganic Nature.

[1] My theory of *suspension* is accepted as a possible theory by M'Dougall (*Body and Mind*, p. 214 f.), and Zwaardemaker (*Ergebnisse der Physiologie*, xii., 1912, p. 627). T. Percy Nunn, in his very suggestive article published in the *Proceedings of the Aristotelian Society* (33rd session, 1911-12), is of opinion that it would hardly make any difference whether entelechy is said to interfere only with inertia or also with energy; he holds that energy "is not a quantity," but "a mathematical fiction." I cannot agree with the latter statement, for to me energy means *quantity of spatial becoming*; but I concede, as is explained in the text, that vitalism *might* violate the principle of conservation—if only there were not such strict material limits of life.

M'Dougall (*Body and Mind*, p. 253) gives the names of a number of British physicists who have denied the possibility of a mechanistic explanation of life—Sir G. Stokes, Lord Kelvin, Maxwell, P. G. Tait, Balfour Stewart, Sir W. Crookes, Sir O. Lodge, Sir J. J. Thomson, Sir J. Larmor, Professor Poynting (see also my *Gifford Lectures*, ii. p. 225 f.). Most of these authors have advocated the Cartesian theory, as did most decidedly Sir O. Lodge in chapter ix. of his well-known *Life and Matter* (3rd ed. p. 152 ff.).

J. S. Haldane believes that vitalism *must* violate the principle of the conservation of energy (see p. 28 of his *Mechanism, Life and Personality*). This is certainly not the case.

THIRD LECTURE

THE LOGIC OF VITALISM—THE PROBLEM OF SUPRAPERSONAL UNITY

THE logic of vitalism is a branch of the logic of *wholeness*. The logic of *wholeness*, however, is the beginning and the end of all logic—at least if it is understood that *logic* is essentially *the theory of order*.

The *theory of order*[1] is the science of those characteristics of objectivity by means of which objectivity is *one ordered totality*. The term "Objectivity" is here employed in the very general sense of "everything that is consciously possessed, or rather—to use a very neutral expression—*had* by myself," in the sense of "everything that is, so to say, the content of my consciousness." "Objectivity," then, is not an equivalent of "Nature" or "Reality" in this place. If now the theory of order tries to discover *order* in *the one totality* of objectivity, it follows that it must start from the knowledge of what *order* and *totality* are. This primordial knowledge of the meaning of *order* and *totality* may be called the *mystery* of logic.

The concept of order being given, the thinking,

[1] Cp. my *Ordnungslehre, ein System des nicht-metaphysischen Teiles der Philosophie* (1912), and *Die Logik als Aufgabe* (1913).

i.e. the ordering Ego now endeavours to find out all the *signs of order* in objectivity. This is done by means of *introspection*. With regard to every specificity of the content of "experience," in the widest meaning of the word, the Ego has to ask, What makes this special experience an ordered one? Here again it is a sort of mysterious knowledge—called "evidence"—which enables the Ego to find what it is in search of.

This, *such*, *relation*, *the other*, *difference*, *number*, *arrangement*, *manifoldness*, *the whole*, *the parts*, are among the irreducible *signs* found by the most general branch of the theory of order. And among relations let us mention *implication* or *consequence* as a very important sign of order that we shall ourselves use later on: "one thing is because another thing is," the word "is" meaning here "is an object" in the most general sense defined.

The most general branch of the theory of order, or logic, is then, as we have seen, based upon the concept of *order* in general, and includes the concept of a *whole* in a narrower sense among its irreducible constituents. Every concept is a *whole*, *i.e.* is more than the mere sum of its constituents as enumerated in definition. And thus from the very beginning the concept of *wholeness* or *totality*, so important in the theory of vitalism, is fully justified *as a concept*. This now is a merely formal legitimation; but we want some sort of justification with regard to *natural agents* that are *whole*. We shall get what we want if we follow the theory of order along its path.

At the end of the *general* theory of order, relating

to *all* objectivity, stand the concepts of *becoming*, *substance*, and *causality*; but they stand there as mere postulates expressing, so to speak, a hope with regard to future order and nothing more; and it is only by the creation of a new and very strange concept that this hope of logic can be fulfilled.

Let us see briefly how this is to happen:[1]

I possess or *have* all those *objects* which are *this* and *such* and *related* and *so many*, etc. I *have* them consciously. And I have them always in a *now*, in a certain moment. But in a certain moment I may also have consciously a something that bears an indication or sign on itself that denotes not *being*, but *having been*, or, in relation to the Ego, *having been possessed consciously*. This sort of sign or indication—quite irreducible in its immediateness—I shall call the sign of *time*. But this is only a word; for the sign is not what we are all accustomed to call time, but only a certain irreducible content of consciousness relating to the concept of time.

On the foundation of my consciously possessing indications or signs of time, or, if you prefer a familiar word to our abstract analysis, on the foundation of *memory*, I now formulate the following statements: I am enduring inasmuch as I possess something consciously at all, but I am unstable or *becoming* inasmuch as I have *now this* and *then that*.

And now I endeavour to formulate some further postulates of order.

May I not also say: *It*, *i.e.* objectivity, is *stable* or enduring as *the same It* with regard to certain of

[1] See *Ordnungslehre*, pp. 124-133, 145-149.

its characteristics and yet changes or *becomes* with regard to certain others? If so, I may say that the merely logical principle of identity—*A is A*—has gained some ontological importance, or rather has been used in an ontological analogy; and this on the foundation of my immediate knowledge of the Ego, which endures as *the same* and is yet changing.

And further: May not the *becoming* or changing of the *It* be connected in itself *as if* every phase of becoming were a *reason* of some other becoming if you look to the future, and a *consequence* of some other becoming if you look to the past? If so, becoming would be *intelligible*, because it would be *rationalized*. For becoming would be conceived on the analogy of the purely logical relation of *implication*; the principle of *sufficient reason* would have gained an ontological importance in the same way as the principle of identity had previously done. "B is *because* A is," we have said before; "this becoming is such *because* that becoming has taken place," we should be able to say now.

Of course it would be a great advance towards *order*, if we could really formulate what *endures* in all objectivity and if we could rationalize the becoming of objectivity, *as if* there were reasons and consequences in it, *i.e.* if we could conceive so-called "causality" in a rational way.

But we can do neither, at least not without further preparation. Objectivity in its immediateness, in its "immediately being possessed consciously," to speak quite strictly, remains chaotic. Think of *everything* that presents itself to your consciousness

in the space of, say, ten minutes, and you will admit that I am right: there is no rational order of becoming among the contents of consciousness as they are.

But the *theory of order* does not give up its endeavours. If—it says—I cannot discover endurance and rationality of becoming in all objectivity as it is immediately, can I not form a special concept of limited validity on the foundation of all immediate objectivity, which will satisfy my postulates of order, even though immediate objectivity does not satisfy them?

And thus the theory of order forms the concept of *Nature*.

I do not hesitate to say: The *definition*—and the *only* strict definition—of the concept of Nature is, that *Nature* is a something *which satisfies the postulates of a rational theory of becoming*, and which behaves at the same time *as if* it were independent and self-persistent in itself. All other definitions of "Nature" fail to fulfil their promise; and it is certainly quite impossible to found the concept of "Nature" upon its relation to so-called "sensations." On the contrary, sensations taken by themselves are nothing but a part of consciously possessed objectivity in the widest sense, and are not *per se* distinguishable from remembrances, images of the imagination, or hallucinations. It is only because that which a "sensation" signifies is related to the one self-consistent and rational being *Nature* that this sensation *is* a "sensation," and is admitted as such.

Objects of Nature we shall call *natural* or *real*

objects, to distinguish them from objects in general. They are objects of the second order or *mediate* objects. They are *indicated* or *signified by* an immediate object, consciously possessed, *i.e.* by the content of a thought. They are regarded as always the same in themselves, *even if they are not perceived or thought of.* They are *these single quasi-independent objects* in their true independent singleness.

With regard to *Nature*, then, it *is* possible to discover a certain *It* that *endures*, and to connect the changes that occur in this *It* as if the logical relation of *reason* and *consequence* were realized or petrified, so to say, in them. In other words: with regard to Nature the concepts of *substance* and *causality* have a meaning; with regard to Nature a *rational theory* of causality is possible.

This, now, is very important for the theory of natural becoming in general and for the theory of vitalism in particular. If only we keep in mind what *Nature* means to us, what *becoming* or change means, and *in what form we become acquainted with natural objects*, we shall be able to make some *a priori* statements about the *possible forms of becoming.* We can say something about a certain limited number of types in which natural *becoming* may appear, and about the qualities of these types.[1]

Our *acquaintance* with the objects of Nature—to begin with this topic—*always* starts from sense-data which possess a spatial character, let me say: *a sign of spatiality.* Data relating to Nature are always not only *now* and *such*, but also *here.* All that we

[1] Cp. *Ordnungslehre*, pp. 173-187.

immediately know about Nature is, then, of the form of a *now-here-such*. This does not mean that all the immediate objects of our consciousness which are of the form of a now-here-such signify mediate objects of Nature. We have already said that they do not. It means that there are *no* states of Nature knowable to us immediately, *except* by data of that form.

Becoming in Nature is a something "between" *two states* of Nature.[1] As, then, a state of Nature can only be experienced in the form of a now-here-such, it follows that *natural becoming*, as far as it is to be experienced *immediately*, is always given by *two* data, no more and no less, of the form *now-here-such*. This is very important for what is to follow.

The meaning of *Nature* and *becoming* has been stated. But, in order to be well prepared for our *a priori* deduction of the possible forms of becoming, we must devote a few words to a certain consequence of what we have called the *quasi-rational*

[1] In a review of my *Ordnungslehre* (a review which, by the way, refers to a few purely mathematical topics exclusively, and this from an orthodox Russellian point of view) I am told that the concept of *becoming* is superfluous, as "all the properties of a motion can be deduced" if motion is defined "by expressing the co-ordinates as functions of the time" (*Mind*, N.S. No. 89). I should be glad to learn from my critic how he can "deduce" the behaviour of a dog, the restitution of Clavellina, or the history of the Roman Republic in this way, *i.e.* without the concepts *the same*, *enduring*, and *becoming* (cp. *Ordnungslehre*, p. 174, note 1, and p. 210 note).

Mathematicians are very often inclined to neglect everything that they cannot attack by their own methods, and to identify their own limited subject with the totality of philosophical problems. But, as Schopenhauer has well said: "Wo das Rechnen anfängt, hört das Verstehen auf" (*Satz vom Grunde*, § 21).

connexion of becoming in itself, or the rational conception of causality. Every instance of *becoming* is to be regarded *as if* it were the reason of a later and the consequence of an earlier one, it is —to introduce now the usual names in a specified meaning—to be regarded as *cause* on the one side, and as *effect* on the other. This is what the *rational* conception of so-called *causality* means.

Now in logic a reason can never have a consequence that is richer in content than itself; the *degree of manifoldness*, *i.e.* the number of irreducible constituents of a concept can never increase in the course of consequences. If, then, we regard causality as an analogon to the logical relation of *implication* or, what is the same thing in the last resort, *reason* and *consequence*, it follows that the *effect* can only be accounted for by the *cause* if the cause is at least of the same degree of manifoldness as the effect. Cause and effect, it is true, are here objects of Nature and not mere concepts, and therefore the purely logical concept of a "degree of manifoldness" has to be changed in some way in order to be applicable. But there is no difficulty in doing this, as any state of Nature may, so to say, be covered by a concept, and therefore be regarded as having a degree of manifoldness itself.

This, then, is the most essential principle of a rational theory of becoming and causality: *The degree of manifoldness of a natural system cannot increase from itself.*

And now we proceed to our *a priori* argument.

Two states of a natural system, embracing one

phase of change, are, as we know, the starting-point. The change that has led from one to the other has to appear as the quasi-consequence of some former becoming. This is our postulate; *but we do not know* a priori *of what kind the former or earlier becoming may be* that we are in search of.

In the first possible case, the state of things may be simply as follows. There is the change or becoming we start from; it is flanked by two states, say B and C, each of them of the form of a *now-here-such.* If now we happen to discover an earlier spatial state of our system, A, which is such that the *degree of manifoldness* of the states A, B, and C is the same though the three states are not identical, and if each single constituent of the becoming flanked by B and C may properly be related to a corresponding singularity of the becoming between A and B, then our postulate is satisfied. The problem of a rationalization of becoming is solved.

But the problem is also easily solved under the following circumstances: There is again the one becoming marked by the spatial states B and C; but C is of a higher degree of complexity than B, and there is no earlier becoming in the system to which the increase of manifoldness can be due. If then we find some earlier becoming *outside* the system in the *spatial* sense of the word that may be responsible for the increase of manifoldness, the problem of rationalization is again solved. As in the first case, we have found the quasi-sufficient reason of what happened in former *spatial* becoming.

Let us call it *singular causality* in the cases studied

so far. Causality as known in physics and chemistry is always of the *singular* type. The principles of mechanics, as formulated by Newton, and the two chief principles of so-called energetics are expressions of special aspects of singular causality.

But singular causality by no means covers the whole field of possibilities with regard to causal connexion.

Imagine our system again at the two stages B and C. Suppose that C is richer in manifoldness than B is in one special respect, namely, with regard to the number of elementary things, say "atoms," constituting the system. What are we to do if we assume that we *know*—it is certainly imaginable—that no elementary *thing* has ever entered the system by passing through its boundaries? Unless we are to sacrifice the *rationality* of becoming, we cannot avoid saying that *thing-creating* natural agents have been at work. And *motion-creating* natural agents are to be postulated, if the system had been at rest, say, until the time t and then *begins* to change, there being *no* former becoming "outside" the system in the spatial sense of the word that can be responsible for the beginning of change.

Two forms of *creation* are thus possible as forms of natural becoming. Neither of them actually occurs, it seems. But it is of some logical value to remember that certain psychologists who reject the theory of psycho-physical parallelism do assume a "creation" of energy on the part of the "soul."

The last type of becoming starts again from two spatial states of a system, the degree of manifoldness or complexity of which is different, the complexity

having been increased during the change from B to C. The difference of manifoldness in this case is not due to the existence of more elementary things in the second state, but to another peculiarity: *the number of different kinds of relations among the "things" present is greater in the second state than in the first.* A greater number of elementary concepts are now necessary to determine the second state of the system considered as a concept, and this is what the expres-

FIG. 2.—Diagram illustrating the fourth possible type of becoming.

A homogeneous distribution of elements is made heterogeneous without any machine-like preformation in space.

sion "higher degree of manifoldness" really means. Imagine sixteen balls of the same size and composition arranged in rows of four at equal distances from one another. Their arrangement is now less complex than if they were arranged, say, in lines suggestive of a plant (Fig. 2). A greater number of concepts are required to describe the latter formation, because there is a much greater variety of relations, all of them in this case merely spatial.

If, then, in a given natural system an increase of the degree of manifoldness, *i.e.* of complexity, occurs, of the kind just explained, and if, on the other hand,

we *know* that this increase has not been prepared in any way inside or outside the system in space, that there has not been any kind of spatial preformation, then, unless we are to violate the rationale of change, we are obliged to introduce *non-spatial factors of becoming*, and credit them with the increase of complexity that has occurred. Let it be well understood : there is no creation of things, and no creation of becoming *as such.* The sufficient reason for the amount of mere becoming as such may be present in space ; but the sufficient reason for the greater variety of relations establishing itself before our eyes is not.

The most important case of an increase of the degree of manifoldness occurs when an arrangement that is a mere sum is transformed into an arrangement of the character of *unity* or *totality* of some kind. We shall therefore give to this type of possible becoming the name of *unifying causality.*

Now, unifying causality is the type of becoming encountered in the organic world.

Has not our analytical description of unifying causality been almost verbally a description of the differentiation of a harmonious-equipotential system, say of the development of the blastula of the sea-urchin or of the restitution of parts of the branchial apparatus of the Ascidian Clavellina? An equal *sum-like* distribution of possibilities is transformed, without preformation in space, into an unequal and *whole* distribution of actualities : that was our description of what happens in harmonious differentiation ; and we added that the principle of the conservation

of energy is not violated by this process. Now, this is a perfect illustration of what goes on in the fourth type of becoming. A natural system passes from one state to another which is more complex. It is no longer a mere sum that can be described by a few elementary concepts; it has become a *whole*, a totality, a unit, that requires a great number of concepts for its description, since it abounds in a variety of relations. This all happens without any machine-like preformation in space.

Thus then we have justified vitalism on the basis of logic and ontology: *wholeness* is a legitimate concept, and becoming that leads from non-wholeness to wholeness, *i.e. unifying causality*, is one of the *a priori* possible forms of becoming. We have proved this on the foundation of what may be called "the geometry of becoming" in the form of an analogy.

We may also say, though we have not used the word so far, that we have proved *wholeness* and *becoming* to be real *categories*, and the union of wholeness and becoming to be a legitimate categorical union.

But what about the concept of *teleology*, which is certainly much more popular than *wholeness* and *unifying causality* are? To put it briefly: Apart from its psychological and its merely descriptive sense we may use the word *teleological* whenever a result that is a whole is reached *by a succession of various steps or phases* of becoming, each of which is subject to unifying causality. The words *evolution* or *evolutionary becoming* may also be applied in this case, as, for example, in embryology.

But the concepts of wholeness and unifying causality are more fundamental than the concepts of teleology and evolution are, the latter being, so to say, categories of the second degree.[1]

Our argument has been quite unbiassed by any of the current philosophical theories; it has been quite self-consistent and, so to say, immediate. But, as the subject is very important, I should now like to try to legitimate vitalism by yet another line of argument. I should like to show that "categories" as laid down by Kant can be brought into conformity with the doctrine of vitalism.

Kant's conception of a category differs somewhat from ours, if we apply that term to such concepts as *becoming*, the *enduring It*, the *quasi-logical connexion* of becoming in itself, *singular* and *unifying causality*. Our concepts of order with respect to Nature may be *resolved* into the really elemental concepts of *this*, *such*, *relation*, *reason*, *consequence*, *manifoldness*, etc. Kant's categories, on the other hand, and especially those of "relation," namely, "substance," "causality," and "*Wechselwirkung*," are regarded as elemental in themselves, as "Stammbegriffe des reinen Verstandes."

Kant tries to *deduce* his categories, as he calls it, and his deduction is of two different kinds.

Firstly, in what he calls the "transcendental deduction," he tries to show that categories are the prerequisite of experience, so that, conversely, every

[1] I am glad to see that this doctrine of the primacy of *wholeness* is also advocated in the very suggestive Gifford Lectures delivered by Professor B. Bosanquet, *The Principle of Individuality and Value* (1912); see, in particular, pp. xxv., 123, 135, 146, 181, etc.

concept that proves to be a prerequisite of experience is, by virtue of this very feature, a "category." From this point of view it is easy to show that *wholeness*, or the double concept of *the whole and the part*, is a real category also; for it is as indispensable in forming *any* kind of experience with regard to Nature as are the concepts of a *thing* with its *properties* and the concepts of *cause* and *effect*.

But Kant tried also to give what he calls a "metaphysical deduction" of the categories, and this has become very famous.

Kant wishes to prove the *completeness* of his system of categories. He therefore says: Categories are concepts of connexion with regard to objects in Nature. If, then, we could enumerate completely all the possible concepts of *purely logical* connexion, *i.e.* of connexion not among things in Nature but among logical objects, and could co-ordinate a "category" with each of these concepts of logical connexion, the system of categories would also be complete. Now, the system of the possible forms of *judgments*, as developed in classical logic, enables us to enumerate the purely logical concepts of connexion completely. The system of the forms of judgments, then, is the foundation of the system of categories. The category of *substance*, *i.e.* the concepts of *thing* and *property*, is co-ordinated with the so-called categorical judgment, the category of *causality* with the hypothetical judgment, etc.

If we take it for granted that Kant's deduction of the categories is legitimate as a philosophical method in general—a problem that we cannot attempt to

solve in these lectures—it is easy to show that a category like *wholeness* or *totality* or *individuality*, or whatever you like to call it, must also be "deduced," and has simply been forgotten by Kant. Kant, in fact, forgot to enumerate among the forms of judgments, considered from the point of view of relation, what might be called the *complete conjunctive* judgment, *i.e.* the judgment that expresses a *definition.* He only recognizes the categorical judgment, *i.e.* judgment in the form *A is a B*; the hypothetical judgment, *i.e.* judgment in the form *If there is A there is B*; and the disjunctive judgment, *i.e.* judgment in the form *A is either B or C or D, etc.* The complete conjunctive judgment, which has the form *A is* B_1 *and* B_2 *and* B_3 *and . . .* B_x was not recognized by him as an independent type of judgment, though it really is. And to this form of judgment the category of *wholeness* corresponds.

I have added these few remarks about Kant's theory of the categories for those of you who are familiar with the philosophy of that great man.[1] Personally, I am of opinion that my own justification of *unifying causality* is more immediate and less artificial, and that it has the further advantage of "deducing" *unifying becoming* as a whole, whilst a category in the Kantian sense would have to be secondarily united with something else in order to constitute a real natural factor. But it is important that even on Kantian lines a legitimation of the concept of natural *wholeness* is possible.

[1] Compare my article in *Kantstudien*, vol. xvi., 1911; see also *Gifford Lectures*, vol. ii. pp. 296-329.

The logical justification of the concept of *wholeness*, and the theory of *unifying causality* in particular, not only legitimate the vitalism we have developed in our previous lectures, they raise at the same time a great number of new and very important problems.[1]

We have only spoken of the biological *individual* so far, and we have seen that the type of becoming in this individual is unifying causality. But besides the biological individual, there is still to be considered the community of biological individuals, the totality of living beings, *the* process of life as expressed in the theory of descent.

We may accept this theory without restriction, it seems. Strong arguments, especially those derived from the geographical distribution of animals and plants and from palaeontology, are in favour of it. But what about the *law* of so-called phylogeny? That the well-known theories connected with the names of Lamarck and Darwin do not account for the true phylogenetic law seems almost universally granted at the present day. Both theories may be true in certain fields, but they do not touch the main problem, the apparent *progressive complication* in phylogeny. They can only account for certain kinds of adaptedness in certain organisms—and even then only with the aid of various hypothetical additions, as, for example, the inheritance of acquired characters. But, unfortunately, concerning the *central* problem of phylogeny we are *absolutely ignorant.* We can offer only a formal hypothetical solution, namely, the

[1] Compare *Gifford Lectures*, vol. i. p. 250 to end; vol. ii. pp. 340-358; *Ordnungslehre*, pp. 251-289.

assumption that there may be a certain *suprapersonal* kind of entelechy that realizes itself in space in the phylogenetic process, just as personal entelechy realizes itself in ontogeny.

The phylogenetic problem as a question of supra-personal unity, then, is the first problem newly raised by our logical discussion of *wholeness*. It is in any case a necessary task of science to examine the phenomena of phylogeny with regard to the question whether there be any indication of factual wholeness in them or not.

There is, however, a second problem of a similar kind, namely, *the history of men*, into which we are able to see farther than into the problem of phylogeny.

The evolutionary character of history, its *wholeness in becoming* as we might call it, was most strongly advocated by Herder and Hegel, and must no doubt remain the leading idea for every one who desires to grasp historical facts from the point of view of *order* with due respect to their peculiarities in comparison with other facts of reality. History *as the working of one evolutionary law* is the point in question, not laws *of* history or *in* history ; not that which is repeatable, but the one line of becoming which is unrepeatable. This at least is the main problem of order, in relation to which all others are secondary.[1]

[1] I fully agree with what Bosanquet says (p. 102 of his *Principle of Individuality and Value*, 1912) : "We are constantly being told that the intelligence can deal with nothing but repetitions. This is simply an echo of the Logic of extension and classification which . . . can never, surely, give a genuine account of knowledge."

But is there really any reason for assuming history to be an evolutionary unity? Is it not a mere logical postulate, quite barren when brought face to face with facts?

No doubt we do *not* yet *know* for a fact that history is a unity in becoming. On the contrary, we see certain features in history that seem to make its evolutionary character unknowable in principle, or at least extremely difficult to discover. In the first place, if the suprapersonal wholeness in becoming exists, there is certainly a great deal of chance mixed up with it. This feature, which to a certain extent appears also in phylogeny and even in individual biology, will be studied in the next lecture on a larger scale. Secondly, a strange difficulty arises from the fact that the historian is himself a link in the evolutionary process he intends to discover, that process being by no means finished. He is really in the position in which an embryonic cell would be, supposing it were a thinking being and we asked it to say whether the strange collection of processes, amidst which it stands, is a supracellular unity or not. Thirdly, there is the question, What can the supposed end of historical evolution be? Certainly not a material state, as the end of ontogeny is. But if immaterial, nothing can be said about it. Even with respect to individual entelechy we were only able to speak about its effects, we could not say what it was in itself, and this quite apart from metaphysical problems.

The problem of a real evolution in history, then, seems in fact to be hardly approachable. And yet

there are certain *signs of wholeness* in history, or at least in the object of history, *i.e.* the community of men, or "the State" in the widest sense of the word. There is, firstly, the general biological fact of propagation, which seems to signify something suprapersonal. In the second place, there is a certain harmony among the professions of men that seems not to be due to chance. In the third place, there are some changes with regard to the behaviour of mankind in general, which seem to us to be "progress," as, for instance, the abolishing of torture and slavery. Fourthly, it has been said that what Wundt calls the "heterogeny of purposes" is also a sign of suprapersonal evolution. This is the fact that any action of a single person or of a community of men may have effects which were not foreseen, and *which were not at all intended*, but which are yet of benefit to the whole. Hegel speaks of the "List der Idee" in a similar sense.

But more than anything else, it seems to me, the *existence of a moral consciousness in man* gives us a sign of suprapersonal unity. Moral feeling, taken in itself, is quite unintelligible and absolutely isolated. It loses its isolated character when—to put it briefly—*ethics* becomes part of *logic*, *i.e.* as soon as a man's moral feeling is regarded as a sign of the part he is to play in a suprapersonal wholeness, of which he would otherwise have no knowledge. *Conscience* seems to be the means by which the suprapersonal agent guides the will. And conscience is guided by the two ideals of *pity* and *duty*. Pity regulates the relations between all men *as mere men*, whilst the feeling of duty tells

a man his own personal task, which nobody but himself can fulfil.

Thus, then, there certainly *are* signs of supra-personal unity in history, or at least in human society. But, of course, great caution is required here, and there is certainly a very great amount of contingency, *i.e.* non-wholeness, in every actual historical and political formation, as for instance in the various states as they actually exist. At any rate we must *not* say that *every* historical event is a step in historical evolution.

Here we close our theory of *becoming*, and of *unifying causality* in particular. In what follows we shall regard the problem of *wholeness* from yet another point of view. So far our view of the world has been throughout dualistic: we have had singular *and* unifying causality, inorganic *and* organic Nature, contingency *and* order. May we not try to replace dualism by some sort of monism? Not, of course, by the modern monism of contingency, but by a true *monism of order*?

FOURTH LECTURE

THE PROBLEM OF MONISM—METAPHYSICAL CONCLUSIONS

THE concept of *wholeness*, as applied to Nature, has been used by us hitherto in very close connexion with the concept of *becoming*. Now it is possible to show that this has been only provisionary, and that the concept of *wholeness* is able to play a far more important, and in fact the most important part, in a rational theory of Nature.

In the theory of "becoming" we applied the concept of *wholeness* to limited systems occurring in Nature. The fact that such systems become individual wholes instead of mere sums gave us the concept of unifying causality. Now at length the profound importance of the concept "*a whole*" is to become evident and to justify our remark at the beginning of the last lecture, that logic begins as well as ends with the concept of order.

Our possession of the concept of order in some unexplained and mysterious way was the starting-point of the theory of order. And now having come to the end of that theory, we may ask in con-

clusion : *What is natural reality but an arrangement of facts constituting a whole?*

This question brings us to the last part of our discussions.[1]

The doctrine that the universe is *one ordered whole* may be called the *monism of order*. What then does this monism of order—or briefly *monism*, since the possibility of a "monism of summation," so much in vogue nowadays, is to be excluded *a limine*—what then does monism advocate? It amounts simply to this : Whatever is a constituent of the being or becoming of the universe has its *one specified* place in *one* order, or, in short, it is *this* being or becoming in *this* order.

There can be no doubt that this monism, were it true, would supersede all other theories of natural order. Everything would prove to have been provisionary and would merge into the concept of monism. There would be no limited systems, for there would be only *the one* system ; and, strange to say, there would be no "laws of Nature" with regard to independent repeatable kinds of becoming, for there would be but *one* law, and no kind of independence. What is usually called a *law of Nature* would therefore be nothing but a certain form of the behaviour, so to say, of The One, a form of behaviour that has occurred so far in many cases, but is by no means guaranteed for the future ; the theory of causality as laid down by Hume would thus receive quite a new and surprising illustration.

[1] Cp. *Ordnungslehre*, pp. 284-289, and my article in *Logos*, vol. iv., 1913.

And, finally, there would be no difference between "mechanism" and "vitalism," for there would be no *mechanism*. There would be one organism, so to say; or, in other terms, the universe would be *the one* organism.

Very many concepts and doctrines now fashionable in science and philosophy would thus have to be given up, and would prove to be only of a preparatory kind. But one thing whose disappearance would certainly not afflict us is *chance*, *contingency*, which is, in fact, the greatest enemy of all thinking, that which breaks all the postulates of order, the μὴ ὄν. Chance would disappear; for where there is but one order with ordered constituents there is no chance or contingency: every *this* is a *this* in *this* order.

Is what we have been describing a state of the logic of natural reality, actually attainable? I am sorry to say it remains a mere hypothetical ideal. It is true that if we had the actual concept of *the one order of Nature*, we should know *by* having this concept everything that is knowable; in the same strange manner, perhaps, as in mathematics, where we are able to know about the species *by* knowing about the genus, *e.g.* from the concept of "conic section" we are able to develop the different possible forms of these sections. But we do *not* possess the concept of "the one order of Nature," we are not even on the way to establish it hypothetically, and we have every reason to be satisfied with having at least some notions of "natural laws," whether provisional or not.

The main reason for our inability to attain the

ideal of a monism of order is *the impossibility of denying the actual existence of contingency*. By "contingency" in Nature we mean every kind of being or becoming that cannot be brought into relation with *any* natural wholeness whatever, *i.e.* not even with a limited whole. Let us look for a moment at the various ways in which contingency meets us in Nature; and let us begin with rather concrete cases.

Embryological development, as we have seen, occurs in an autonomous way, the wholeness of the individual living form being guaranteed by a non-mechanical natural agent, the essence of which is wholeness, in the way of unifying causality. But is *every* single character of an embryo the special and determined link of *this one* whole? Certainly not, as appears most decidedly from the simple fact that the *single cells* which make up the organs of the adult individuals of a species have a different position and size in each individual. Wholeness, then, does not go so far as to determine every peculiarity of cellular construction: the position of the single organ-forming cell is *contingent*, in spite of all vitalism.

With regard to phylogeny our actual knowledge of a suprapersonal evolutionary factor is, unfortunately, very poor. But we may assume with good reason that besides the line of evolution there is also something contingent in phylogeny, with regard to pure variations as well as adaptations. Contingencies with regard to suprapersonal wholeness form the subject-matter of Lamarckism and Darwinism. The specific characters of the organic forms which are

the expression of suprapersonal wholeness are, in other words, mixed or overlaid with characters of form contingent with regard to this wholeness. And it is this contingency in "form" that makes it so difficult to discover the true evolutionary phylogenetic line or even to establish a really "rational" system of the organisms.

And what about the hypothetical evolution in history proper? Granted that this *evolution* exists, it is certainly obscured, so to say, by what may be called psychological *cumulations* of a non-evolutionary character to such an extent as to be hardly discoverable. And, moreover, if we regard the ethical qualities of the single individuals in suprapersonal evolution as the true signs of their suprapersonal significance, are there not very many actions that are *not* "moral," and of which we cannot say that they "should be"? There *is* moral evil in the world, and this moral evil is contingent with regard to evolution; in fact, it may be said to be anti-evolutionary, just as disease of the cells or organs is with regard to the evolution of the individual body.

These, then, are cases where contingency is mixed with non-contingency or wholeness. But what are we to say with regard to *chance* or *contingency* in our common daily experience? Is not almost everything "contingent" here? Is it not contingent that we met such and such people in the street to-day, and that the stones by the wayside lie just as they do? In fact, all *inorganic* constellations seem to be contingent to such an extent *that it appears*

at first glance as if the realm of inorganic science had no room at all for the concept of wholeness, but only for the concept of "law of Nature" with regard to *independent* cases of becoming.

The result therefore seems to be: contingency mixed with wholeness in the organic, pure contingency in the inorganic world.

But, it seems, we have been a little too rash in stating this result. *For is not the concept "law of Nature" itself a sign of wholeness*, at least wholeness of a certain kind? Does not the existence of "laws" prove that there is at least a certain degree of community in the totality to which they apply?

And, moreover, is there not a certain community of existence when one body *acts* upon another, say by pushing? But the *constellation* of matter is throughout contingent, you will say. With regard to this problem it seems to me very important that the ancient concept of a *harmony of Nature* has come to the front again recently in a modern form. I shall say nothing here about the constellation of the heavenly bodies, of the Milky Way for example, for all these things are still very problematic at present. I will only refer to some very important results published by the American biological chemist, Professor Henderson, in his remarkable book, *The Fitness of the Environment*. Henderson calls attention to the numerous exceptional properties of water and carbonic acid. The so-called "constants" of these two substances are in fact "exceptions" in almost every branch of physics and chemistry, and it is the unique constant in each case that makes them so

important to living things. There is a sort of mutual adaptation between water and carbonic acid on the one side and life on the other; and this seems to prove a certain wholeness or teleology of the universe in general, including organic *and non-organic* Nature.

We must therefore modify our former general result by saying that *throughout* the universe there is wholeness mixed with contingency.

This, then, is the Aristotelian dualism of εἶδος and ὕλη, of form and matter, in a modern form. Must we accept it as a definite answer, and thus give up altogether our logical ideal of a "monism of order"?

There can be no doubt that any one who regards experience as the most important source of factual knowledge and also believes that hypotheses must be formed in close connexion with experience, is bound to remain a dualist. He may allow the hypothesis of a suprapersonal unity in phylogeny and history, but he will be unable to accept the monism of order, *i.e.* the doctrine that reality is *one ordered whole* in which *every single* case of being and becoming has its own place of order.

But there have always been others with whom the postulates of logic came first, and they have advocated the monism of order in spite of all that we know about the existence of non-wholeness, *i.e.* of chance and contingency. In earlier periods of philosophy the problem of "Theodicy," as it is generally called, was the expression of this belief in the primary function of postulation. "Theodicy" means the justifica-

tion of God, which in the dry language of logic is equivalent to saying that nothing exists that is unordered with regard to *one* wholeness. We now understand how it could be the chief task of Leibniz, for example, to show that all kinds of evil in the world are not what they at first seem to be, if only you go deeper, and that in any case the actual world is the best of all possible worlds.

The "Theodicy" and the monism of order in a purely logical form are based in the first place upon the postulatory concept of factual wholeness—though this as a rule is by no means made out in a clear and explicit manner—and, secondly, upon the fact that there are *limits to our capacity of factual knowledge*. As this second point is of a certain principal importance, we will go a little deeper into a discussion of it. We shall see that monism of order, improbable as it may appear to many of us, is by no means to be entirely denied—and this on account of certain peculiarities in the limitations of human knowledge.

Let us begin with one special form of defence of monism that is historically important as well as important in our own days.

Leibniz goes with Spinoza in so far as he assumes that every elementary character of the Absolute—be this in itself what it may—is represented to the human mind by a certain peculiarity of the *spatial* kind. But with respect to spatiality our knowledge is very limited, as regards things very distant and as regards things very small, the latter being the more important restriction. Unlimited experience, then,

would enable us to know of the one order of things in space and therefore of the one order of Reality.

Those who do not accept vitalism and yet feel that there is something else in Nature than mere mechanism, have occasionally in our own days advocated a view that is rather similar to that of Leibniz. They speak of the "union of universal teleology and mechanism," meaning by this phrase that the universe would appear as one ordered whole and as a mechanical system at the same time, if only we had a sufficient knowledge of spatial reality, *which is supposed to furnish us with a symbol of everything that there is.*

But to this form of a hypothetical monism of order, and, in fact, to all endeavours to "unite" mechanism and "universal teleology," *i.e.* ordered wholeness, it is possible to make very grave objections—so grave, indeed, that nothing of the theory of "union" remains. And these objections can be made just as well if we start from *wholeness* as if we start from *mechanism*.[1]

If we begin with the concept of wholeness, we remark that it certainly would be very strange if there were *one* order with regard to spatial reality and yet we could discover nothing of it; for we know a good deal both about things very distant and about things very minute. This, then, counts against monism of order *as such*, if ever it takes the form of spatial monism. With regard to spatially symbolized

[1] A full discussion of the following argument may be found in my paper published in *Sitzungsberichte d. Heidelberg. Akad. d. Wiss.*, Phil.-hist. Kl., 1914, No. 1.

reality our knowledge is in fact not so scanty that we could entirely overlook an order that would be expressed in everything.

But we have a further observation to make, and this in particular against the theory of a so-called "union" of universal teleology and mechanism. A spatial monism of order would *negate* "mechanism," for it would give to every singleness of being and becoming *this one* place; therefore there would be no proper "laws," for there would be no independence of being and becoming. Therefore the concept of mechanism in its real sense is the true opposite to the concept of *wholeness* of order, from which we started, and thus there can never be a "union" of the two.

But if we begin with "mechanism," could it not then be shown that ordered *wholeness* might be its result? Certainly it is possible to show that *wholeness* can be the result of a true mechanism that follows the principles of Newton or others of a similar kind—*but what sort of wholeness is it*? From a *real* "mechanism" nothing but the "most probable" distribution of elements can result, according to the principles of the calculus of probability. And every *final* arrangement of a real mechanism can *only* be of a *geometrical* type, comparable with that of the planetary systems. Could this be "the other side" or "a symbol" of what we must attribute to Reality by reason of what we *know* from biology, history, psychology, and ethics? The assumption is simply absurd.

And so we may sum up as follows. There is a

special kind of monism of order that may be called the monism of Spinoza, Leibniz, and the Neo-Kantian school, or, in short, *spatial monism of order*. On the hypothesis *that every character of the Absolute has a spatial symbol*, or in short, on the basis of what we may call *the Spinozian dogma*, it tries to find the one ordered whole in spatial data. But it *fails* simply because there *is not* this ordered wholeness in spatial Givenness. And, moreover, it must be remembered, firstly, that, *if* there were ordered wholeness in spatiality, we could not speak of "mechanism," and, secondly, that, from mechanism in a true sense nothing but geometrical wholeness can arise.[1]

Monism of order may, however, be justified in principle by a very different method, by taking the concept of the *limited* character of the possibilities of our knowledge in a much deeper sense.

This form of monism *rejects the Spinozian dogma*, to put the matter shortly.

And this means the following: Be the Absolute

[1] By far the best instance of a spatial monism of order in recent times is contained in the *Gifford Lectures* of Bernard Bosanquet. It is particularly interesting to see that his mechanism *is not* a real "mechanism." The fact that I feel unable to accept *any* kind of monism of order as more than a mere logical ideal does not diminish my admiration for this brilliant system. James Ward, in his *Naturalism and Agnosticism* (vol. ii.), advocates a non-spatial monism, similar in certain respects to that of Lotze, whilst Bosanquet may be said to be a Hegelian to a great extent. I confess I am not quite clear about the point of view taken by J. S. Haldane in his *Mechanism, Life and Personality* (1913). Haldane rejects mechanism as well as vitalism; it seems that he is in favour of a monism of order of some sort. Compare pages 104 and 122 of his book, and in particular page 132 f., where personality is called "the great central fact of the universe," and this in the sense of "not mere individual personality."

what it may, in any case it cannot be postulated to assume that all its elementary characters are able to be symbolized to the human mind by spatial signs.

In our vitalistic theory we have shown that in a field of research, which may be said to be artificially limited, there is reason to assume that non-mechanical natural agents are at work, acting not in space but "into" space, so to say. Metaphysically interpreted this already means that the Spinozian dogma is broken. But now we break that dogma much more fundamentally, though merely in the negative sense, by remarking that it is *not necessary* to regard absolute Reality as something that is *throughout spatially symbolized.*

And on this basis the monism of order, or "Theodicy," which we know is the same thing in the last resort, may be justified in spite of all experience proper. For if we allow the Absolute to consist of innumerable qualities which are *not* spatially symbolized and are therefore unknowable, it follows that the world of experience proper *can* only give us a fragmental knowledge of absolute Reality and nothing more. We do not speak here of temporary ignorance due, say, to the minuteness or remoteness of the objects, *but of the fundamental impossibility of knowing.* In short, because we are human, *i.e.* spatially limited beings, we *cannot* know. And therefore from our piecemeal experience we can never say whether there be not a monism of order in the Absolute: ἐκ μέρους γὰρ γινώσκομεν—"We know in part," as St. Paul says (1 Cor. xiii. 9).

This, then, is the last hope of the monism of order. You may say that it is a hope resting upon human imperfection and that it does not mean very much; that it relies a little too much on mere possibilities. You may then reject monism of order in favour of dualism; you will then follow experience proper, but, remember, you will renounce the fulfilment of logical postulates and you will also get into great metaphysical difficulties, of which the greatest is the problem of evil, then absolutely insoluble. On the other hand, as a dualist you do remain loyal to experience and to your properly human nature. You may even go so far as to say that even with our hypothetical monism of order, based upon human imperfection and fundamental ignorance, it would still be necessary to explain why the Absolute appears to us not only imperfect but bad in certain respects, *i.e.* as something that is strictly negative. And, it must be admitted, not even hypothetically can the monism of order give an answer to this formulation of the question of *non-wholeness*.

Personally, I confess that, while a monism of order for the reasons explained is not altogether impossible—though even then it is not quite satisfactory,—I myself feel forced to accept the *dualistic* doctrine, in spite of all logical postulates. This dualism, then, might be summed up as follows. There is the material world as the world of chance, but there is also a world of form or order that manifests itself in certain areas of the material world, namely, in the biological individual, and probably, in another way, in phylogeny and history also; there

may even be formlike constellations in what we call the Inorganic.

Let me conclude these lectures with a few very general remarks.

We have based the philosophical part of our lectures upon what we have called logic or the *theory of order*. Now the theory of order deals merely with what *I* consciously possess, and is therefore *absolutely free from metaphysics*. *I* endeavour to bring order into what *I* have experienced, into *my* "*Erlebtheit*," to employ a German word hardly translatable into English,—that is all; *I* retain and fix what I regard as a sign of order, *i.e.* a concept *by which* there *is* order in the whole of that of which I am conscious.

In this sense the whole theory of order may be said to be founded *solipsistically*, that is with regard to *I* as the one who arranges. When I say that a thing *is*, it always and exclusively means that it is or may be an object to my consciousness. This applies also to *natural* objects, for we have said nothing whatever about Nature, except that its objects may be regarded *as if* they had an independent existence of their own.

Solipsism is the only basis of philosophy that is not dogmatic; for, let it be well understood, solipsism does not say that I "exist" as a "substance" or something else, but it only analyses the fundamental pre-phenomenon: *I have something consciously*. And this is the only fact—though not a "fact" in the usual sense—that is beyond any doubt.

Solipsism, then, is *not* dogmatic, not even in a negative manner. It does *not* say: What I consciously have is *nothing but* my phenomenon. It merely says: What I consciously have is *certainly* my phenomenon—whether it "be" anything else or not.

But now, for reasons that cannot be explained here in full, the ordering Ego tries to go beyond the limits of a pure theory of order and to establish the concept of a something that "is" *not* merely in so far as it is consciously possessed or possibly possessed in some way. Thus, for reasons of order, the theory of order gives itself up and asks for metaphysics.

But if metaphysics is to be of any use at all and not a mere poetic fiction, it must start from what is consciously possessed by me, *i.e.* from "experience," and go on in such a way as to formulate judgments, which, *though they mean more than experience, yet are such as to make experience appear as it is as their consequence.* In other words: metaphysics must use the method of induction in the deeper sense of the word, and can only reach *hypothetical* results; for it is impossible to get from the consequences to the reasons in a univocal way; and experience is the *consequence* in this case.

Leaving aside all other questions, let us ask only this: What does our vitalistic and supravitalistic theory mean with regard to metaphysics; at least with regard to certain fundamental metaphysical questions?

Only once in the course of our lectures have we gone beyond the boundaries of solipsism and the pure theory of order. That was when we spoke of

the alternative of dualism and monism of order, and tried to show that only under a certain "metaphysical" assumption would monism be tenable —at least in principle. We were then dealing with what we called the *Spinozian dogma*, and to this we shall now briefly return.

Monism of order would be an all-embracing conception of the universe, and, moreover, a truly metaphysical doctrine. Our vitalism, personal as well as suprapersonal, is of a far more modest character; it either rests immediately on "facts" or remains in close relations to them. And yet it violates the Spinozian dogma also, for it looks upon *Nature* as something that cannot be entirely comprehended under spatial symbolism. There is more in Nature than merely something in space; there is something in it that only has certain discrete points of manifestation in space, so that space data can give us only *fragments* with regard to Nature as it is. *Nature*, so far, is only included in the realm of the theory of order; that is to say, it is *my* Nature and only behaves *as if* it were independent in itself. But what will happen if now we allow *Nature* to be a sign of something that is more than Nature as a concept of order, *i.e.* of something absolute?

The Absolute—we are now entitled to say—is in any case such as to possess properties which at least in part are *not* symbolized to the human mind by spatial signs. This holds on the basis of a real monism of order, which completes the empirical non-wholeness and makes it an absolute wholeness by adding unknowable unspatial possibilities, and

it also holds on the basis of mere personal and supra-personal vitalism as a dualistic theory, remaining in close relation with facts. Only if there were *one whole discoverable in spatial data as they are* would it be otherwise, as we have seen. Only in this case should we not be obliged by the postulate of monism of order and by the empirical facts of wholeness to enlarge the realm of reality beyond the limits of spatiality, because we should find what we are in search of quite immediately. But this case does not occur.

It certainly is the most important of all the consequences of vitalism that it violates the Spinozian dogma. *Extensio* is *not* an *attributum* of the "substance" that has to enter into *all* its *modi*. And what happens in space is only part of what "happens" altogether in reality. Of a certain part of absolute happening we get full signs, *i.e.* in inorganic becoming; of another part we get at least fragmental signs, namely, with regard to the organic world. *How many kinds of becoming may there be of which our mind is not able to form the least conception?* Thus the way has become open for possibilities of all sorts, *and this on the foundation of facts*, for personal vitalism at least rests quite immediately on "facts." It is no longer necessary to look upon spatial data as a strange image of the Absolute in its completeness and then to be disappointed with this strange image. There *is not* a complete "image" of the Absolute in space.

This is one of the metaphysical consequences of vitalism which we wished to mention. Let us now

briefly advert to another relation between vitalism and general metaphysics, which must remain far more problematic than what we have said so far.

When passing from the pure theory of order to the sphere of real knowledge, *i.e.* metaphysics, one of the most fundamental questions is: Which of the *elementary* concepts of logic may be of any metaphysical significance? Now it is not difficult to show—though it cannot be explained in full here—that the metaphysical validity of concepts like *this*, *such*, *relation*, *manifoldness*, *number*, etc., is one of the prerequisites of the possibility of metaphysics altogether, and is therefore merely a postulate on the part of the metaphysician. But also *space*, or rather "spatiality," is certainly a special something, or rather, a special kind of relation, to which quite a *special* and *particular* kind of relation, a *particular system of relations*, in the Absolute corresponds, though, as our rejection of the dogma of Spinoza implies, it does *not* express the totality of relations in the Absolute. And what holds good for space holds good also for *time* or *becoming*; i.e. *becoming*, as understood in the theory of order, is the sign of one *particular* absolute system of relations—unknown and unknowable to the human mind "in itself."

But, what about the *connexion* of becoming in itself, on the analogy of *reason* and *consequence*, as postulated by the theory of order? What about all *predetermination* of becoming?

In the theory of order we pressed the postulate of determination so far as to establish a sort of personal *entelechy* in order to have a sufficient reason

for what happens in the biological individual. Even with regard to phylogeny and history, *i.e.* with regard to suprapersonal processes which are *unique* and *not yet finished in their uniqueness*, we postulated non-mechanical suprapersonal determining agents.

What, then, does *this* mean in metaphysics? Can it mean anything at all? Does not our postulating the entelechial predetermination of suprapersonal processes simply mark the limits of our understanding?

This is what Bergson teaches at the present day, and what the great German philosophers taught in another form in the beginning of the last century. In reality there is *freedom* of becoming; not freedom with regard to the parts among each other, in which case the concept of *wholeness* would be violated in favour of a strict theory of "monads"—though not in the sense of Leibniz whose theory is far from being a strict monadic theory—but *freedom in becoming itself.*

What shall we say here? Shall we dismiss the postulates of the theory of order and accept the phrase of the French philosopher that "Dieu se fait" in the suprapersonal evolutionary processes, or must we bring over into metaphysics the logical postulate of predetermination in the same manner as we did with all the elementary concepts of the theory of order, including space and becoming? It seems to me that a real decision with regard to this question is absolutely impossible, for we are always bound to *start* from our *empirical* knowledge in all our metaphysical construction. For our empirical knowledge,

as we have seen, must appear as a *consequence* of our metaphysical construction. Now it is clear without further discussion that what we *know* about phylogenetic and historical becoming might be just as well what it is, whether we accept some unknowable sort of metaphysical predetermination of that becoming, founded on the very "essence" of the absolute Being —as was the belief of Plotinus and Spinoza for example—or whether we regard the absolute Being as a something "qui se fait."

The ultimate problem of the philosophy of wholeness, then, is a matter of belief. The decision can be nothing but personal in this case; it will depend on the value which you attribute to logic, in the last resort; and it may also depend on irrational matters of feeling.

But what is not a mere belief and not a matter of feeling is the existence of factual wholeness in Nature, the existence of something that is certainly more than a mere sum. And to have proved this, and thus to have given a sound foundation to all further speculations about natural and metaphysical *wholeness*, is the merit of vitalism.

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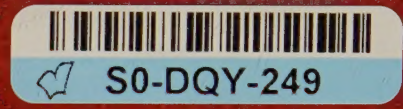
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